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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

KO, DANIEL BOKMIN

ART UNIT

PAPER NUMBER

2189

DATE MAILED: 10/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/632,681

Applicant(s)

ZHANG ET AL.

Examiner

Daniel B. Ko

Art Unit

2189

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _____ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

This action is responsive to the application filed on 7/31/2003. Claims 1-20 have been submitted for examination.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. Claims 1- 20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Applicants claimed invention discloses the method includes decoding a page size stored in the variable portion of the matching entry and a 1-bit field associated with the matching entry in order to support the variable page size. According to Applicant's specification on page 11, lines 10-21 (See Fig. 5B), bit 12 is used as the PAGE_SIZE [1] and set to zero to indicate no more bits are needed and page size is 8KB. Also, it states that because bit 12 is zero, the offset occupies 13 bits of the virtual address, including bits 0 through 12 (page 11, lines 17-18). Since first bit is always set to zero in this case, offset (0 to 12 bits) can only access half of the address that starts with 0, because bit 12 is always 0 for 8KB page size. Likewise, for 16KB page size example in

Fig. 5C, since bit 13 and 12 is set to 0 and 1 respectively, offset (0 to 13 bits) can only access a quarter of the address that starts with 01 and unable to access any address starts with 00, 10, or 11.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 12, 13, and 20 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 12, 13, and 20 recite the limitation "the current page size" in first line of claim 12 and in second line of claim 13 and fourth line of claim 20, respectively. There is insufficient antecedent basis for this limitation in the claim.

3. Claims 13 and 20 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 13 and 20 recite the limitation "the hit logic generates a miss indication after determining that the current page size is less than or equal to the page size". This limitation is not confirming to the Fig. 8 and specification (see Fig. 8, element 812, page 15, lines 19-20). In order to generate the miss indication (Fig. 8, step 816), the current page size needs to be less than the decoded page size, not less than or equal.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
 2. Ascertaining the differences between the prior art and the claims at issue.
 3. Resolving the level of ordinary skill in the pertinent art.
 4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
4. Claims 1-5 and 11, 14-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mathews (US Patent 6,625,715) and Kalyanasundharam (US Patent 6,549,997).

Regarding claims 1, 11, and 16, Mathews teaches a method comprising:
determining whether a virtual address is stored in a translation lookaside buffer (TLB), the TLB including a plurality of entries, wherein the entries include a minimum virtual page number bit string (Fig. 4, element 430, column 6, lines 65-67, column 7,

lines 1-3, virtual fixed page address) and a variable bit string (Fig. 4, element 440, variable page address, column 7, lines 8-12), the determining including,

comparing a first bit string of the virtual address to the minimum virtual page number bit string of each of the entries (See Fig. 7, column 8, lines 31-34);

determining whether the first bit string matches the minimum virtual page number bit string of one of the entries (See Fig. 7, column 8, lines 31-34);

if the first bit string matches the minimum virtual page number bit string of one of the entries, a 1-bit field associated with the matching entry (Fig. 7, element 756, valid bit, column 9, lines 50-53; column 14, lines 21-29; column 16, lines 19-30), wherein the decoding determines a set of bits of the variable bit string; and

comparing the set of bits of the variable portion to a second bit string of the virtual address (Fig. 16, element 1630; column 16, lines 30-45).

Mathews fails to teach decoding a page size stored in the variable portion of the entry. Kalyanasundharam teaches a dynamic variable page size translation of addresses (See abstract). Kalyanasundharam teaches decoding a page size stored in the variable portion of the entry (See Fig. 2, elements 210, 214, 218, column 5, lines 49-55, column 6, lines 13-22). Kalyanasundharam discloses encoding size-field data. So, decoding it to get page size is obvious.

At the time of invention it would have been obvious to a person of ordinary skill in the art to combine the Mathews with Kalyanasundharam. The motivation for doing so

would have been a faster dynamic variable page size translation of addresses (See, Kalyanasundharam, column 3, lines 36-40). Kalyanasundharam states that the invention enables faster translation by eliminating unnecessary circuitry (column 3, lines 40-47).

Regarding claim 2, Mathews teaches a method, comprising:
if the set of bits matches the second bit string, generating a hit indication; and if the set of bits does not match the second bit string, generating a miss indication (column 16, lines 30-33).

Regarding claims 3, 14, and 17, Mathews teaches a method, where the TLB is a fully associative TLB (Column 1, lines 39-46).

Regarding claim 4, Kalyanasundharam teaches a method, wherein a page size is encoded in the second bit string (See Figure 2, column 6, lines 13-15).

Regarding claims 5, 15 and 18, the TLB is a second level TLB is obvious because the Mathews teaches a TLB (column 5, lines 29-47) and it works same whether TLB is a first level TLB or a second level TLB.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel B. Ko whose telephone number is 571-272-8194.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Manorama Padmanabhan can be reached on 571-272-4210. The fax phone number for the organization where this application or proceeding is assigned is 703-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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